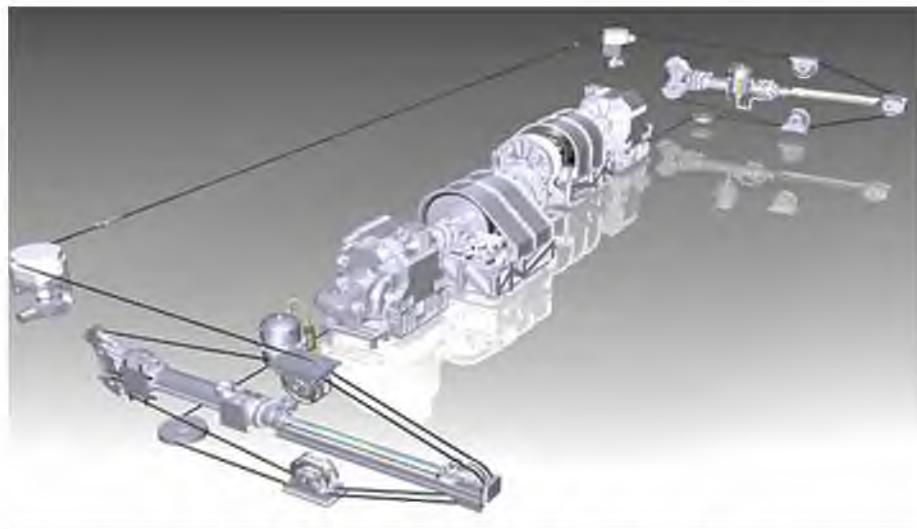




RCS: DD-A&T(Q&A)823-529



## **Advanced Arresting Gear (AAG)**

As of FY 2021 President's Budget

Defense Acquisition Management  
Information Retrieval  
(DAMIR)

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## Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance  
ACAT - Acquisition Category  
ADM - Acquisition Decision Memorandum  
APB - Acquisition Program Baseline  
APPN - Appropriation  
APUC - Average Procurement Unit Cost  
\$B - Billions of Dollars  
BA - Budget Authority/Budget Activity  
Blk - Block  
BY - Base Year  
CAPE - Cost Assessment and Program Evaluation  
CARD - Cost Analysis Requirements Description  
CDD - Capability Development Document  
CLIN - Contract Line Item Number  
CPD - Capability Production Document  
CY - Calendar Year  
DAB - Defense Acquisition Board  
DAE - Defense Acquisition Executive  
DAMIR - Defense Acquisition Management Information Retrieval  
DoD - Department of Defense  
DSN - Defense Switched Network  
EMD - Engineering and Manufacturing Development  
EVM - Earned Value Management  
FOC - Full Operational Capability  
FMS - Foreign Military Sales  
FRP - Full Rate Production  
FY - Fiscal Year  
FYDP - Future Years Defense Program  
ICE - Independent Cost Estimate  
IOC - Initial Operational Capability  
Inc - Increment  
JROC - Joint Requirements Oversight Council  
\$K - Thousands of Dollars  
KPP - Key Performance Parameter  
LRIP - Low Rate Initial Production  
\$M - Millions of Dollars  
MDA - Milestone Decision Authority  
MDAP - Major Defense Acquisition Program  
MILCON - Military Construction  
N/A - Not Applicable  
O&M - Operations and Maintenance  
ORD - Operational Requirements Document  
OSD - Office of the Secretary of Defense  
O&S - Operating and Support  
PAUC - Program Acquisition Unit Cost

PB - President's Budget  
PE - Program Element  
PEO - Program Executive Officer  
PM - Program Manager  
POE - Program Office Estimate  
RDT&E - Research, Development, Test, and Evaluation  
SAR - Selected Acquisition Report  
SCP - Service Cost Position  
TBD - To Be Determined  
TY - Then Year  
UCR - Unit Cost Reporting  
U.S. - United States  
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)  
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)

## Program Information

**Program Name**

Advanced Arresting Gear (AAG)

**DoD Component**

Navy

## Responsible Office

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**Date Assigned:** July 12, 2018

## References

### **SAR Baseline (Development Estimate)**

Under Secretary of Defense (Acquisition, Technology & Logistics) Approved Acquisition Program Baseline (APB) dated November 17, 2017

### **Approved APB**

Assistant Secretary of the Navy (Research, Development & Acquisition) (ASN(RDA)) Approved Acquisition Program Baseline (APB) dated February 5, 2020

## **Mission and Description**

The Advanced Arresting Gear (AAG) program is a system level acquisition for a new arresting gear for the GERALD R. FORD-class (CVN 78) aircraft carrier. AAG is designed to provide total life cycle cost savings by reducing O&M costs when compared to the NIMITZ-class (CVN 68). AAG provides new operational capabilities required by the GERALD R. FORD-class, which include the ability to safely and efficiently recover both heavier and faster aircraft as well as light weight unmanned air vehicles that will enter the fleet in the future.



## Executive Summary

### Program Highlights Since Last Report

The AAG APB was updated to incorporate the fourth AAG shipset as well as schedule updates for the completion of Integrated Test, IOC and Initial Operational Test and Evaluation. All dates align with the milestones documented in the GERALD R. FORD-class APB that was also recently updated.

Planning for the CVN 81 AAG shipset is in progress. The Navy is also engaged in discussions with the French Ministry of Defense to initiate Foreign Military Sales in support of the Future French Aircraft Carrier.

To improve AAG reliability, data collected during future shipboard operations beginning in FY 2020 will be used to refine models/methodologies and correct failures prior to deployment, with additional focus on Availability to include future improvements to Mean Time to Repair and Mean Logistics Delay Time. The Navy also developed a Reliability Improvement Management Plan to address liens discovered during land based testing and shipboard operations. The plan prioritizes issues based on operational impact, trend data and encompasses cost and schedule estimates.

The Navy is managing concurrent AAG Full Scale Development testing and Shipboard testing on CVN 78. To date, the AAG Jet Car Track Site (JCTS) successfully completed more than 2600 dead load arrestments simulating fleet aircraft at various recovery speeds/weights. The Runway Arrested Landing Site (RALS) successfully completed more than 1600 total aircraft arrestments to include F/A-18E/F, E/A -18G, E-2C, E-2D, C-2A and T-45 Type/Model/Series aircraft. On February 28, 2019, the first AAG barricade test was successfully completed. Subsequently, several additional barricade net arrestments using E-2C and F/A-18E "hulk" airframes were successfully completed. To date, 958 total arrestments were completed onboard CVN 78.

The AAG Dynamic Control System (DCS) software underwent extensive testing at both JCTS and RALS to ensure safe operations throughout the planned operational envelope. The DCS software design expanded the AAG performance envelope to meet or exceed the legacy MK-7 equivalent capability. The current DCS software was used to develop the Aircraft Recovery Bulletins (ARBs) that support aircraft operations on board CVN 78.

Final ARBs for F/A-18E/F, E/A -18G, E-2C, E-2D and C-2A were released on August 2, 2019. The ARBs for AAG Barricade and T-45C were released on December 18, 2019. All ARBs were released on or ahead of schedule to support Post Shakedown Availability Testing for AAG Aircraft Compatibility Testing II that was completed on January 30, 2020. AAG meets current Air Wing requirements and will support CVN 78 Flight Deck Certification, Workups and Deployment.

There are no significant software-related issues with this program at this time.



### History of Significant Developments Since Program Initiation

History of Significant Developments Since Program Initiation	
Date	Significant Development Description
March 2015	PMA 251 request to re-designate Advanced Arresting Gear (AAG) as an ACAT IC program.
June 2015	ASN request to OSD to reclassify AAG as an ACAT IC program.
July 2015	AAG reclassified as an ACAT IC program.
December 2016	Navy Center for Cost Analysis completed the Component Cost Position for AAG.
December 2016	Section 125 of the National Defense Authorization Act includes a requirement to perform a Nunn-McCurdy review of AAG using the 2009 APB.
May 2017	PMA 251 submitted a Nunn McCurdy SAR in accordance with the NDAA FY 2017 Section 125.
May 2017	AAG CVN 80 Option for the CVN 79 contract was awarded.
July 2017	The Nunn McCurdy review and certification of AAG was completed and documented in the July 12, 2017 Acquisition Decision Memorandum.
November 2017	AAG received an adjusted APB based on the CAPE ICE completed July 2017 for the Nunn McCurdy review. This APB was approved November 2017 and will become the original baseline.
December 2017	Submitted the AAG Software plan addressing software safety and requirements that reflect the operational concept that addresses the AAG Nunn McCurdy Certification ADM.
January 2018	AAG was reclassified as an ACAT IC.
August 2018	AAG completed manned aircraft Performance Testing at JCTS for F/A18E/F and EA-18G.
August 2018	AAG SDD contract Over Target Baseline/Over Target Schedule re-plan complete.
September 2018	Letter of Offer and Acceptance for Technical Assistance Case between the U.S. Navy and France.
December 2018	First Future French Carrier Working Group meeting held.
December 2018	AAG completed manned aircraft Performance Testing at RALS for F/A18E/F and EA-18G.
August 2019	IT-B3 JCTS complete.
August 2019	A Rough order of Magnitude (ROM) for the Future French Carrier EMALS/AAG effort was provided to French Ministry of Defense August 2019.
October 2019	IT-B4 RALS complete.
December 2019	All Aircraft Launch Bulletins (ALBs) and Aircraft recovery Bulletins (ARBs) for F/A-18E/F, EA-18G, E-2D, E-2C, C-2A, T-45C and Fleet Barricade capability released.
January 2020	CVN 78 Post-PSA AAG System Re-Certification completed 21 December 2019. Formal certification message containing required information was released January 8, 2020.

## Threshold Breaches

### APB Breaches

<b>Schedule</b>		<input type="checkbox"/>
<b>Performance</b>		<input type="checkbox"/>
<b>Cost</b>	RDT&E	<input type="checkbox"/>
	Procurement	<input type="checkbox"/>
	MILCON	<input type="checkbox"/>
	Acq O&M	<input type="checkbox"/>
<b>O&amp;S Cost</b>		<input type="checkbox"/>
<b>Unit Cost</b>	PAUC	<input type="checkbox"/>
	APUC	<input type="checkbox"/>

### Nunn-McCurdy Breaches

#### Current UCR Baseline

PAUC	None
APUC	None

#### Original UCR Baseline

PAUC	None
APUC	None

## Schedule



Schedule Events				
Events	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate
Milestone A	Jul 2003	Jul 2003	Jul 2003	Jul 2003
Milestone B	Feb 2005	Feb 2005	Feb 2005	Feb 2005
IT-B3 JCTS complete	Aug 2020	Aug 2019	Aug 2019	Aug 2019 (Ch-4)
IT-B4 RALS complete	Dec 2021	Oct 2019	Oct 2019	Oct 2019 (Ch-5)
Milestone C	Aug 2021	N/A	N/A	N/A (Ch-3)
IOC	Mar 2022	Jul 2021	Jan 2022	Jan 2022 (Ch-2)
IOT&E	Aug 2021	Nov 2023	May 2024	May 2024 (Ch-1)

### Change Explanations

(Ch-1) The IOT&E current estimate changed from February 2022 to May 2024 to align with CVN 78 IOT&E.

(Ch-2) The IOC current estimate changed from September 2022 to January 2022 to occur at the end of PDT&T and to align with CVN 78.

(Ch-3) The MS C current estimate changed from February 2022 to deleted. This is aligned with standard practices for shipbuilding programs and aligns with CVN 78.

(Ch-4) The IT-B3 JCTS Complete estimate changed from February 2021 to August 2019 to reflect the actual completion date.

(Ch-5) The IT-B4 RALS completed current estimate changed from June 2022 to October 2019 to reflect the actual completion date.



**Notes**

AAG IOT&E is based on CVN 78 IOT&E.

AAG IOC occurs at the completion of PDT&T. CVN 21 ORD Change 2 of June 22, 2007, revalidated by JROC on April 27, 2015, defines IOC as successful completion of Post Shakedown Availability (PSA) Construction work necessary to complete outstanding PSA items is projected to finish by the end of PDT&T.

Milestone C deleted, aligned with CVN 78 Class and standard shipbuilding practices.

**Acronyms and Abbreviations**

IOT&E - Integrated Operational Test and Evaluation

IT - Integration Test

JCTS - Jet Car Track Site

OT - Operational Test

PDT&T - Post Delivery Tests and Trials

RALS - Runway Arrested Landing Site

## Performance

Performance Characteristics				
SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Demonstrated Performance	Current Estimate
Aircraft Interoperability				
The hookload limits and G-load limits applicable to each aircraft listed in the Development Threshold plus those listed in Table 2 shall not be exceeded when each aircraft engages the AAG at up to its maximum weight, net applied thrust, and maximum aircraft engaging velocity.	The hookload limits and G-load limits applicable to each aircraft listed in the Development Threshold plus those listed in Table 2 shall not be exceeded when each aircraft engages the AAG at up to its maximum weight, net applied thrust, and maximum aircraft engaging velocity.	The hookload limits and G-load limits applicable to C-2A,E-2 Type/Model/Series (TMS), F/A-18, EA-18 TMS, F-35, and T45 aircraft shall not be exceeded when each aircraft engages the AAG at up to its maximum weight, net applied thrust, and maximum aircraft engaging velocity.	The hookload limits and G-load limits were demonstrated to be within limits for F/A-18 E/F and EA-18G maximum weight, net applied thrust, and maximum aircraft engaging velocity during RALS testing on 12/30/19.	Meets F/A-18E/F, E/A-18G (completed testing 12/30/18), C-2A, E-2C/D (completed testing 3/11/19) thresholds as defined in Aircraft Recovery Bulletins were published August 2019.
Cycle Time JCTS and RALS demonstration				
30 Seconds	30 Seconds	35 Seconds	RALS testing demonstrated 35-second cycle time on 3/5/2019.	35 seconds
Operational Availability IOT&E demonstration				
0.988	0.988	0.985	AAG is tracking and assessing CVN 78 performance data, under fleet operational conditions, until system maturity is reached in accordance with the CDD. Current cycle-based Operational Availability is calculated to be 0.971 MCBOMF	Time-based data will be collected on future CVN 78 flight operational periods to determine operational up-time and operational total time to assess AAG meeting the Ao requirement.

			based on 747 F/A-18E/F CVN 78 shipboard arrestments for a three wire system.		
<b>AAG Operating Envelope</b>					
9,000 to 55,000 lbs.	9,000 to 55,000 lbs.	13,360 to 55,000 lbs.	JCTS testing demonstrated the ability to absorb deadload arrestment energy within the threshold operating envelope on 03/02/2019. AAG demonstrated the upper energy boundary as depicted in the CDD Figure 1 AAG Operating Envelope on 20 Mar 2019. This event equates to a 57 M ft-lbs arrestment and exceeds the 53.5 M ft-lb upper energy boundary.	Meets threshold.	(Ch-4)
<b>Barricade Interoperability</b>					
<1 minute / < 3minutes	<1 minute / < 3minutes	<3 minutes / <10 minutes	AAG demonstrated 15 seconds/15 seconds time to convert AAG system to support barricade function based barricade testing. AAG demonstrated this requirement during the first barricade arrestment of an E-2C on 28 Feb 2019 with a timed	Meets objective.	(Ch-5)



			conversion of 15 seconds to go from tailhook to barricade and barricade to tailhook configurations.		
<b>Manning</b>					
45	45	55	55 is based on November 2018 Manpower Analysis Report (MAR).	Meets threshold based on AAG MAR.	(Ch-6)
<b>Peak Aircraft Recovery Rate</b>					
Recover 28 aircraft in 21 minutes	Recover 28 aircraft in 21 minutes	(T=O) Recover 28 aircraft in 21 minutes	System analysis (thermal stress) supports recovery of 28 aircraft in 21 minutes for the CVN 78 3 wire system. Aircraft demonstration planned for October 2019.	Will meet objective.	(Ch-7)
<b>Human Systems Integration</b>					
Operable and maintainable by 5th to 95th percentile range of operators/maintainers. operator-system interfaces (e.g., switches, displays) will be operated with minimal errors.	Operable and maintainable by 5th to 95th percentile range of operators/maintainers. operator-system interfaces (e.g., switches, displays) will be operated with minimal errors.	(T=O) Operable and maintainable by 5th to 95th percentile range of operators/maintainers. operator-system interfaces (e.g., switches, displays) will be operated with minimal errors.	Human Systems Integration evaluated during Aircraft Compatibility Testing onboard CVN 78. Retract Operator Control Station and the Integrated Catapult Control Station were evaluated and shown to meet the requirements.	Requirement to be assessed during Aircraft Compatibility Testing (ACT) onboard CVN 78 Jan 2020.	(Ch-8)

#### Requirements Reference

AAG CDD dated July 15, 2008, and the Department of the Navy, Program Executive Officer, Aircraft Carriers, Subject: Transfer of one AAG Engine Set from CVN 78 to CVN 79, dated May 19, 2014, and the Department of the Navy, Director, Air Warfare (N98), Subject: AAG POR Requirements Revision dated February 12, 2016.



### Change Explanations

(Ch-1) Hookload and G Load limits current estimate changed from limits defined in Table 2 of the CDD to limits defined in the published Aircraft Recovery Bulletins.

(Ch-2) Cycle time JCTS and RALS current estimate changed from 30 seconds to 35 seconds as demonstrated by performance.

(Ch-3) Operational Availability IOT&E Demonstration current estimate changed from .985 to time based data will be collected to determine the appropriate Ao for a 3 wire system.

(Ch-4) AAG Operating Envelope current estimate changed from 13,360-55,000 lbs, to AAG Operating Envelope meets threshold through testing.

(Ch-5) Barricade/Interoperability current estimate changed from <1 minute/ <3 minutes to meets the objective through testing.

(Ch-6) Manning current estimate changed from 46 to meets the threshold based on the latest Manpower Assessment Report.

(Ch-7) Peak Aircraft Recovery Rate current estimate changed from Recover 28 aircraft in 21 minutes to will meet objective through Aircraft Compatibility Testing (ACT) conducted in 2019.

(Ch-8) Human Systems Integration( HSI) current estimate changed from the requirement will be assessed during Aircraft Compatibility Testing on board CVN 78 to HSI evaluated during ACT and meets objective.

### Notes

1. Aircraft Interoperability (KPP). Removed Navy-Unmanned Combat Air System requirements in accordance with Director, Air Warfare (N98) direction letter dated February 12, 2016. Table 2 of the AAG CDD delineates Hookload and G-Load KPP objectives.

2. Cycle time JCTS and RALS demonstration (KPP). Separate from the peak recovery rate attribute in Table 3 (AAG Additional Major Attributes) of the AAG CDD.

3. Operation Availability IOT&E demonstration (KPP). These are expected values after system maturity is reached. System maturity is defined as the Navy Support Date plus 25,000 cycles on one ship's system. This should occur not later than CY 2026.

4. AAG Operating Envelope (KSA). Test program prioritized existing MK-7 operating envelope limitations and current airwing Aircraft Recovery Bulletins based on February 12, 2016 letter from Director of Air Warfare (N98).

5. Barricade Interoperability (KSA). Time required to convert an engine from tailhook to barricade operation/convert from barricade to tailhook operation. The times listed are for conditions of daylight, dry deck, and Sea State 1 (i.e., winds 4 to 6 knots and wave heights of 1 to 3 feet).

6. Manning (KSA). Shall be determined by the Navy Total Force Manpower Requirements Handbook (Navy Manpower Analysis Center, April 2000), from a baseline of Operator and Maintenance Workload only.

7.CDD and APB Ao requirements are time-based (operational up-time divided by operational total time). The current 0.971 Ao was calculated based on cycles (up-cycles divided by total cycles). Additional time-based data will be collected on future CVN 78 flight operational periods to determine operational up-time and operational total time to assess AAG meeting the Ao requirement. Per the CDD, "these are the expected values after system maturity has been reached. System maturity is defined by Navy Support Date + 25,000 cycles on one ship's system. This should occur no later than 2023." At this time, AAG has insufficient time and cycles to accurately assess the Ao requirement.

Note 3: In order to meet the CDD Ao requirement, AAG was designed as a four wire system. As installed on CVN 78 and planned installs for future FORD Class carriers, AAG is and will be a three wire system which will preclude AAG meeting the Ao requirement.

**Acronyms and Abbreviations**

ACT - Aircraft Compatibility Testing  
HSI - Human Systems Integration  
IOT&E - Integrated Operational Test and Evaluation  
JCTS - Jet Car Track Site  
KSA - Key System Attribute  
MAR - Manpower Assessment Report  
RALS - Runway Arrested Landing Site



## Track to Budget

### RDT&E

Appn	BA	PE
Navy	1319 05	0604512N
	<b>Project</b>	<b>Name</b>
	2232	CV/CVN Launch (Shared) (Sunk)
	<b>Notes:</b> Sunk in 2019	
Navy	1319 05	0604530N
	<b>Project</b>	<b>Name</b>
	2367	Advanced Arresting Gear

### Notes

A separate RDT&E line item, not shared with non-program activities has been established.

### Procurement

Appn	BA	PE
Navy	1611 02	0204112N
	<b>Line Item</b>	<b>Name</b>
	1611	Carrier Replacement Program (Shared)
Navy	1810 03	0204112N
	<b>Line Item</b>	<b>Name</b>
	4213	Aircraft Support Equipment (Shared) (Sunk)
	<b>Notes:</b> Sunk in 2019	
	4216	Aircraft Launch & Recovery Equipment (Shared) (Sunk)
	<b>Notes:</b> Sunk in 2014	
	4217	Advanced Arresting Gear (AAG) MDAP 529
Navy	1810 08	0204112N
	<b>Line Item</b>	<b>Name</b>
	9020	Spares and Repair Parts (Shared)

### Notes

SCN (17-1611) 0204112N 1611 02 Carrier Replacement Program is shared with all GERALD R. FORD-class ships and is in the CVN 78 class SAR.

### MILCON

Appn	BA	PE
Navy	1205 01	0805376N
	<b>Project</b>	<b>Name</b>

P251      AAG Land Based Test Sites      (Sunk)  
**Notes:** Sunk in 2009

## Cost and Funding

### Cost Summary

Total Acquisition Cost							
Appropriation	BY 2017 \$M			BY 2017 \$M	TY \$M		
	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate	SAR Baseline Development Estimate	Current APB Development Objective	Current Estimate
RDT&E	1446.7	1550.1	1705.1	1373.9	1438.0	1559.0	1361.4
Procurement	764.2	1114.8	1226.3	1012.0	800.0	1220.7	1089.5
Flyaway	--	--	--	1012.0	--	--	1089.5
Recurring	--	--	--	1012.0	--	--	1089.5
Non Recurring	--	--	--	0.0	--	--	0.0
Support	--	--	--	0.0	--	--	0.0
Other Support	--	--	--	0.0	--	--	0.0
Initial Spares	--	--	--	0.0	--	--	0.0
MILCON	16.9	16.9	18.6	16.9	15.4	15.4	15.4
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2227.8	2681.8	N/A	2402.8	2253.4	2795.1	2466.3

#### Current APB Cost Estimate Reference

AIR 4.2 Life Cycle Cost Estimate. Confidence Level of cost estimate for Current APB: 50% The cost estimate recommendation aims to provide sufficient resources to execute the program under normal conditions, encountering average levels of technical, schedule, and programmatic risk and external interference. It is consistent with average resource expenditures on historical efforts of similar size, scope, and complexity. dated May 02, 2019

#### Cost Notes

The Program Life Cycle Cost Estimate was completed in May 2019, to support the APB update to add the fourth shipset to program baseline. The Confidence Level of the cost estimate for the Current APB is 50%.

Consistent with OSD CAPE guidance and the July 12, 2017 CAPE ICE, AAG Procurement Appropriation 1611 utilizes Shipbuilding and Conversion, Navy (SCN) OSD indices and not the SCN Naval Sea Systems Command/Bureau of Labor Statistics indices used for CVN 78 GERALD R. FORD-class.

Total Quantity			
Quantity	SAR Baseline Development Estimate	Current APB Development	Current Estimate
RDT&E	0	0	0
Procurement	3	4	4
Total	3	4	4



## Cost and Funding

### Funding Summary

Appropriation Summary									
FY 2021 President's Budget / December 2019 SAR (TY\$ M)									
Appropriation	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
RDT&E	1147.3	122.5	65.8	22.8	1.0	1.0	1.0	0.0	1361.4
Procurement	692.2	61.0	47.9	61.5	64.9	34.7	37.6	89.7	1089.5
MILCON	15.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2021 Total	1854.9	183.5	113.7	84.3	65.9	35.7	38.6	89.7	2466.3
PB 2020 Total	1858.7	184.5	100.8	75.0	49.7	29.4	30.3	89.7	2418.1
Delta	-3.8	-1.0	12.9	9.3	16.2	6.3	8.3	0.0	48.2

Quantity Summary										
FY 2021 President's Budget / December 2019 SAR (TY\$ M)										
Quantity	Undistributed	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
Development	0	0	0	0	0	0	0	0	0	0
Production	0	3	0	0	1	0	0	0	0	4
PB 2021 Total	0	3	0	0	1	0	0	0	0	4
PB 2020 Total	0	3	0	0	1	0	0	0	0	4
Delta	0	0	0	0	0	0	0	0	0	0

## Cost and Funding

### Annual Funding By Appropriation

Annual Funding								
1319   RDT&E   Research, Development, Test, and Evaluation, Navy								
Fiscal Year	Quantity	TY \$M						Total Program
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support		
2003	--	--	--	--	--	--	--	12.3
2004	--	--	--	--	--	--	--	15.7
2005	--	--	--	--	--	--	--	24.2
2006	--	--	--	--	--	--	--	33.5
2007	--	--	--	--	--	--	--	26.7
2008	--	--	--	--	--	--	--	34.4
2009	--	--	--	--	--	--	--	45.5
2010	--	--	--	--	--	--	--	64.5
2011	--	--	--	--	--	--	--	65.2
2012	--	--	--	--	--	--	--	40.4
2013	--	--	--	--	--	--	--	52.9
2014	--	--	--	--	--	--	--	72.3
2015	--	--	--	--	--	--	--	117.5
2016	--	--	--	--	--	--	--	106.8
2017	--	--	--	--	--	--	--	100.4
2018	--	--	--	--	--	--	--	166.6
2019	--	--	--	--	--	--	--	168.4
2020	--	--	--	--	--	--	--	122.5
2021	--	--	--	--	--	--	--	65.8
2022	--	--	--	--	--	--	--	22.8
2023	--	--	--	--	--	--	--	1.0
2024	--	--	--	--	--	--	--	1.0
2025	--	--	--	--	--	--	--	1.0
Subtotal	--	--	--	--	--	--	--	1361.4

Annual Funding							
1319   RDT&E   Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2003	--	--	--	--	--	--	15.7
2004	--	--	--	--	--	--	19.5
2005	--	--	--	--	--	--	29.3
2006	--	--	--	--	--	--	39.4
2007	--	--	--	--	--	--	30.6
2008	--	--	--	--	--	--	38.8
2009	--	--	--	--	--	--	50.6
2010	--	--	--	--	--	--	70.7
2011	--	--	--	--	--	--	69.8
2012	--	--	--	--	--	--	42.5
2013	--	--	--	--	--	--	55.1
2014	--	--	--	--	--	--	74.3
2015	--	--	--	--	--	--	119.3
2016	--	--	--	--	--	--	106.5
2017	--	--	--	--	--	--	98.3
2018	--	--	--	--	--	--	159.8
2019	--	--	--	--	--	--	158.4
2020	--	--	--	--	--	--	113.0
2021	--	--	--	--	--	--	59.5
2022	--	--	--	--	--	--	20.2
2023	--	--	--	--	--	--	0.9
2024	--	--	--	--	--	--	0.9
2025	--	--	--	--	--	--	0.8
Subtotal	--	--	--	--	--	--	1373.9

Annual Funding 1810   Procurement   Other Procurement, Navy								
Fiscal Year	Quantity	TY \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2012	--	--	1.4	--	1.4	--	1.4	
2013	--	--	52.9	--	52.9	--	52.9	
2014	--	--	7.1	--	7.1	--	7.1	
2015	--	--	16.0	--	16.0	--	16.0	
2016	--	--	9.7	--	9.7	--	9.7	
2017	--	--	2.2	--	2.2	--	2.2	
2018	--	--	10.9	--	10.9	--	10.9	
2019	--	--	11.1	--	11.1	--	11.1	
2020	--	--	4.7	--	4.7	--	4.7	
2021	--	--	16.2	--	16.2	--	16.2	
2022	--	--	11.0	--	11.0	--	11.0	
2023	--	--	18.0	--	18.0	--	18.0	
2024	--	--	5.6	--	5.6	--	5.6	
2025	--	--	7.3	--	7.3	--	7.3	
Subtotal	--	--	174.1	--	174.1	--	174.1	



Annual Funding 1810   Procurement   Other Procurement, Navy							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2012	--	--	1.5	--	1.5	--	1.5
2013	--	--	54.7	--	54.7	--	54.7
2014	--	--	7.2	--	7.2	--	7.2
2015	--	--	16.1	--	16.1	--	16.1
2016	--	--	9.6	--	9.6	--	9.6
2017	--	--	2.1	--	2.1	--	2.1
2018	--	--	10.4	--	10.4	--	10.4
2019	--	--	10.3	--	10.3	--	10.3
2020	--	--	4.3	--	4.3	--	4.3
2021	--	--	14.5	--	14.5	--	14.5
2022	--	--	9.7	--	9.7	--	9.7
2023	--	--	15.5	--	15.5	--	15.5
2024	--	--	4.7	--	4.7	--	4.7
2025	--	--	6.0	--	6.0	--	6.0
Subtotal	--	--	166.6	--	166.6	--	166.6

FY2018 through FY2025 funding supports water twister effort and continuing system improvements accounted for in the APB.



Annual Funding 1611   Procurement   Shipbuilding and Conversion, Navy							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2008	--	0.7	--	--	0.7	--	0.7
2009	1	52.4	--	--	52.4	--	52.4
2010	--	36.3	--	--	36.3	--	36.3
2011	--	44.3	--	--	44.3	--	44.3
2012	--	20.3	--	--	20.3	--	20.3
2013	--	7.3	--	--	7.3	--	7.3
2014	1	15.7	--	--	15.7	--	15.7
2015	--	65.0	--	--	65.0	--	65.0
2016	--	62.3	--	--	62.3	--	62.3
2017	1	83.6	--	--	83.6	--	83.6
2018	--	46.7	--	--	46.7	--	46.7
2019	--	146.3	--	--	146.3	--	146.3
2020	--	56.3	--	--	56.3	--	56.3
2021	--	31.7	--	--	31.7	--	31.7
2022	1	50.5	--	--	50.5	--	50.5
2023	--	46.9	--	--	46.9	--	46.9
2024	--	29.1	--	--	29.1	--	29.1
2025	--	30.3	--	--	30.3	--	30.3
2026	--	89.7	--	--	89.7	--	89.7
Subtotal	4	915.4	--	--	915.4	--	915.4

Annual Funding 1611   Procurement   Shipbuilding and Conversion, Navy							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2008	--	0.8	--	--	0.8	--	0.8
2009	1	57.0	--	--	57.0	--	57.0
2010	--	38.8	--	--	38.8	--	38.8
2011	--	46.3	--	--	46.3	--	46.3
2012	--	20.9	--	--	20.9	--	20.9
2013	--	7.4	--	--	7.4	--	7.4
2014	1	15.7	--	--	15.7	--	15.7
2015	--	63.9	--	--	63.9	--	63.9
2016	--	60.1	--	--	60.1	--	60.1
2017	1	79.0	--	--	79.0	--	79.0
2018	--	43.2	--	--	43.2	--	43.2
2019	--	132.8	--	--	132.8	--	132.8
2020	--	50.1	--	--	50.1	--	50.1
2021	--	27.7	--	--	27.7	--	27.7
2022	1	43.2	--	--	43.2	--	43.2
2023	--	39.3	--	--	39.3	--	39.3
2024	--	23.9	--	--	23.9	--	23.9
2025	--	24.4	--	--	24.4	--	24.4
2026	--	70.9	--	--	70.9	--	70.9
Subtotal	4	845.4	--	--	845.4	--	845.4

Current Estimate reflects PB 2020 GERALD R. FORD-class AAG Budget as provided by Naval Sea Systems Command. Annual funding based on GERALD R. FORD-class appropriated Shipbuilding and Conversion, Navy (SCN) funding for CVN 78, CVN 79 and CVN 80 and CVN 81. The shipset quantity was updated from 3 to 4 and will be reflected in an APB update.

AAG annual SCN funding and quantity are aligned to the AAG system procurements using recently awarded contract pricing and Naval Air Systems Command related support to deliver the AAG system to the GERALD R. FORD-Class as Government furnished equipment.

The AAG Appropriation for 1611 is also accounted for in the CVN 78 GERALD R. FORD-class SAR.

Consistent with OSD CAPE guidance and the July 12, 2017 CAPE ICE, AAG Procurement Appropriation 1611 utilizes Shipbuilding and Conversion, Navy (SCN) OSD indices and not the SCN Naval Sea Systems Command/Bureau of Labor Statistics indices used for CVN 78 GERALD R. FORD-class.

Cost Quantity Information 1611   Procurement   Shipbuilding and Conversion, Navy		
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 2017 \$M
2008	--	--
2009	1	179.2
2010	--	--
2011	--	--
2012	--	--
2013	--	--
2014	1	236.4
2015	--	--
2016	--	--
2017	1	241.8
2018	--	--
2019	--	--
2020	--	--
2021	--	--
2022	1	188.0
2023	--	--
2024	--	--
2025	--	--
2026	--	--
Subtotal	4	845.4

Annual Funding 1205   MILCON   Military Construction, Navy and Marine Corps		
Fiscal Year	TY \$M	
	Total Program	
2009		15.4
Subtotal		15.4

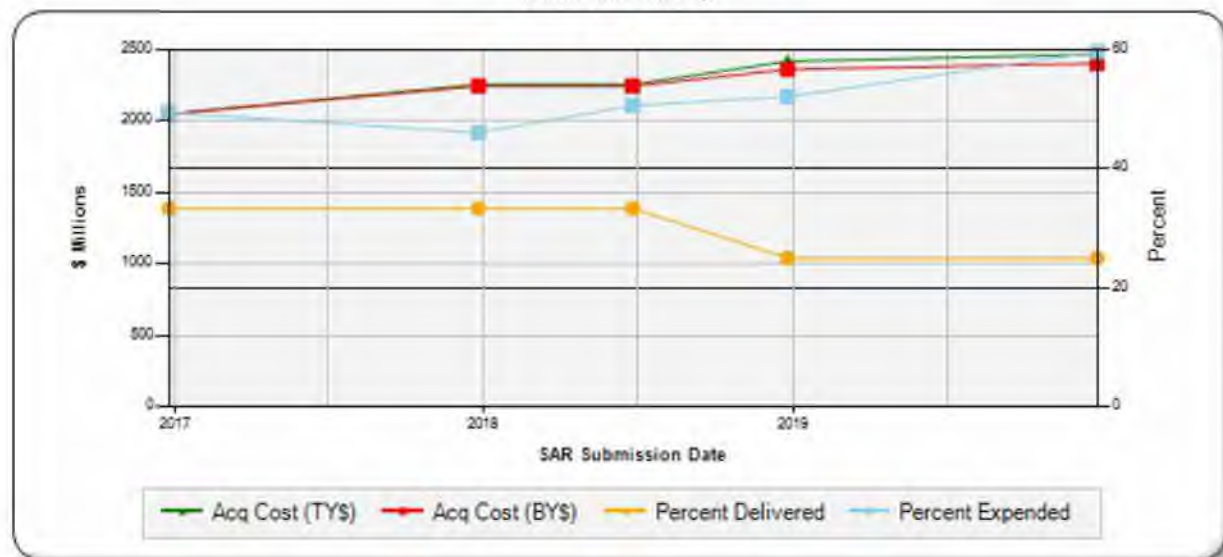
Annual Funding 1205   MILCON   Military Construction, Navy and Marine Corps	
Fiscal Year	BY 2017 \$M
	Total Program
2009	16.9
Subtotal	16.9



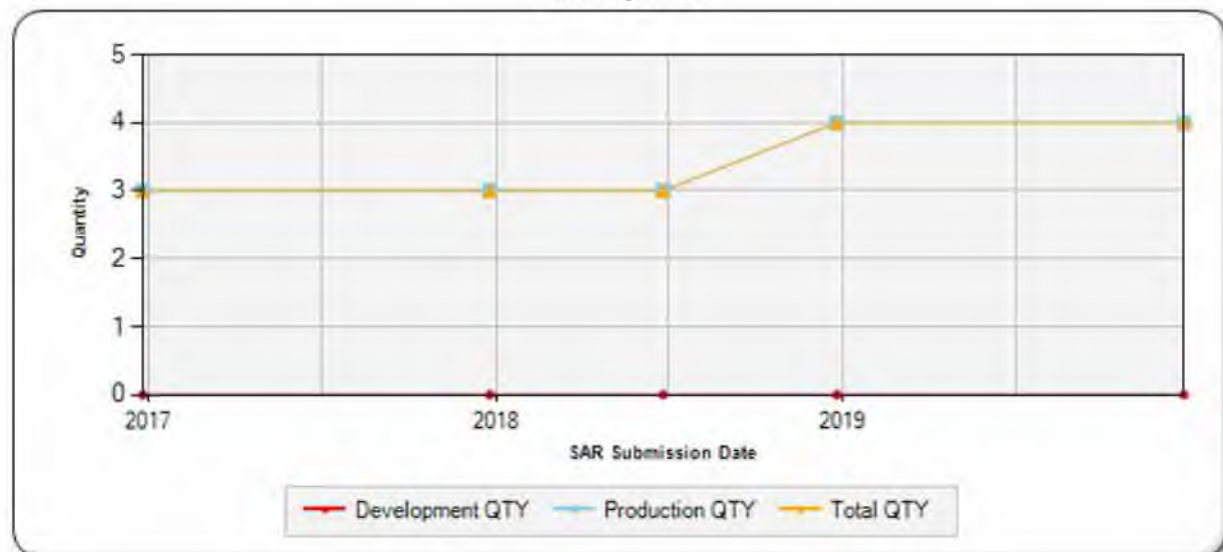
## Charts

### AAG first began SAR reporting in December 2016

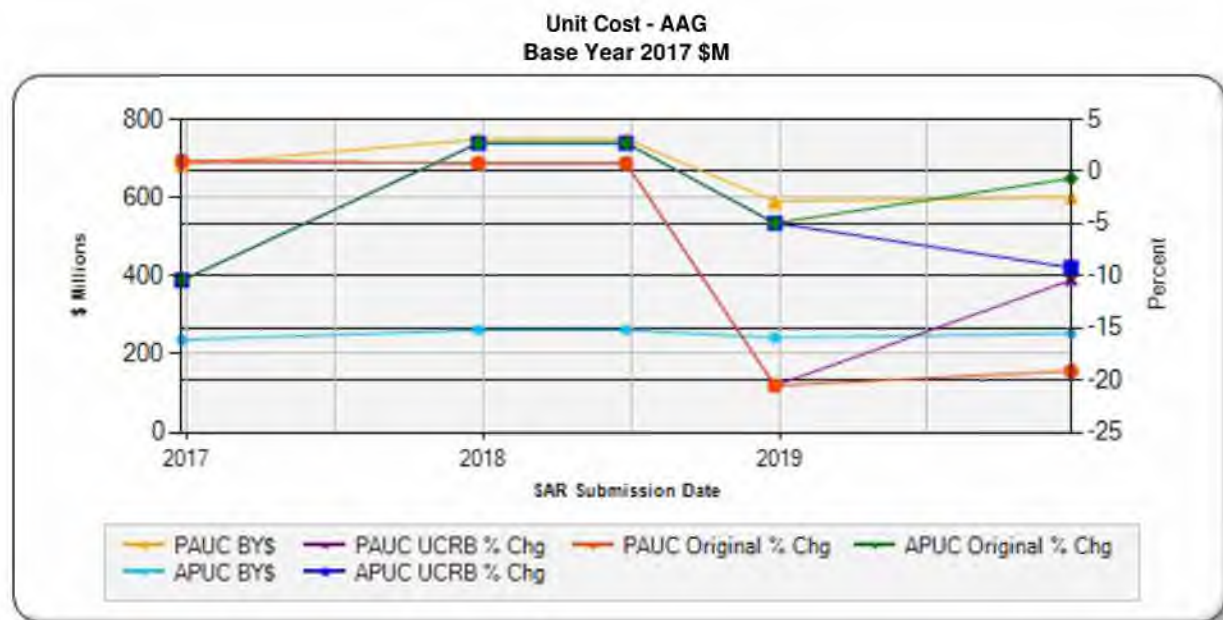
Program Acquisition Cost - AAG  
Base Year 2017 \$M



Quantity - AAG







## Risks

### Significant Schedule and Technical Risks

Significant Schedule and Technical Risks	
Current Estimate (December 2019)	
1.	Sufficiency of system spares to support CVN 78 Post Delivery Test and Trials schedule.
2.	Purchase Cable Drum Follower Screw and Nut Redesign effort. Hardware for long term engineering redesign to meet 70,000 arrestments ready for install by October 2020.

## Risks

### Risk and Sensitivity Analysis

Risks and Sensitivity Analysis	
Current Baseline Estimate (February 2020)	
1.	The current baseline estimate reflects a CAPE ICE approved in July 2017 in support of the AAG Nunn McCurdy certification and establishes the revised APB for the program's reclassification as an ACAT 1C Program. Software development was identified as the primary risk to the System Development & Demonstration program. The new schedule also added deadload and aircraft recoveries to the Dynamic Control System Software releases.
Original Baseline Estimate (December 2016)	
1.	This is a Phase I Transition SAR for the AAG Program. The MDA reclassified AAG as an MDAP ACAT IC on July 23, 2015. The original baseline estimate reflected in this Phase I Transition SAR is the Component Cost Position approved on December 20, 2016 in support of the ACAT 1C re-designation.
Revised Original Estimate (November 2017)	
1.	The revised original estimate is the same as the current baseline estimate.
Current Procurement Cost (December 2019)	
1.	The current procurement cost estimate reflects the CAPE ICE approved in July 2017 in support of the AAG Nunn McCurdy certification and establishes the revised APB for the program's reclassification as an ACAT 1C Program.

## Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
<b>Approval Date</b>	2/10/2005	2/10/2005
<b>Approved Quantity</b>	5	5
<b>Reference</b>	Milestone B ADM	Milestone B ADM
<b>Start Year</b>	2005	2005
<b>End Year</b>	2010	2032

The Current Total LRIP Quantity is more than 10% of the total production quantity The Current Total LRIP quantity is more than 10% of the total production quantity because the current APB covers the GERALD R. FORD-class quantity of four.

### Notes

CVN 78, CVN 79, CVN 80 and CVN 81 comprise the current AAG Program of Record. CVN 81 was added as the fourth ship-set to the current APB. The delivery date for CVN 81 is 2032 as shown above. All ship-sets are fully funded in the FYDP.



## Foreign Military Sales

Country	Date of Sale	Quantity	Total Cost \$M	Description
France	9/11/2018	1	4.0	Technical Assistance Case (FR-P-GXG)

### Notes

The Electromagnetic Aircraft Launch System (EMALS) and AAG Technology Transfer and Security Assistance Review Board documentation is complete and an Exception to National Disclosure Policy is in place. PMA 251 provided a Pricing and Availability Rough Order of Magnitude statement for EMALS/AAG.

The U.S. Navy is in discussions with the French Navy to provide technical support for the Future French Carrier (FFC) replacement. The French Ministry of Defence is expected to make a decision in 2020 on the inclusion of EMALS/AAG as the launch/recovery system on the FFC replacement for the Charles de Gaulle. The U.S. and French Navy conducted several face to face meetings resulting in a Letter of Offer and Acceptance that was issued for a Technical Assistance Case with a total value of \$4M. The first Future French Carrier Working Group meeting was held in December 2018.

### Acronyms and Abbreviations

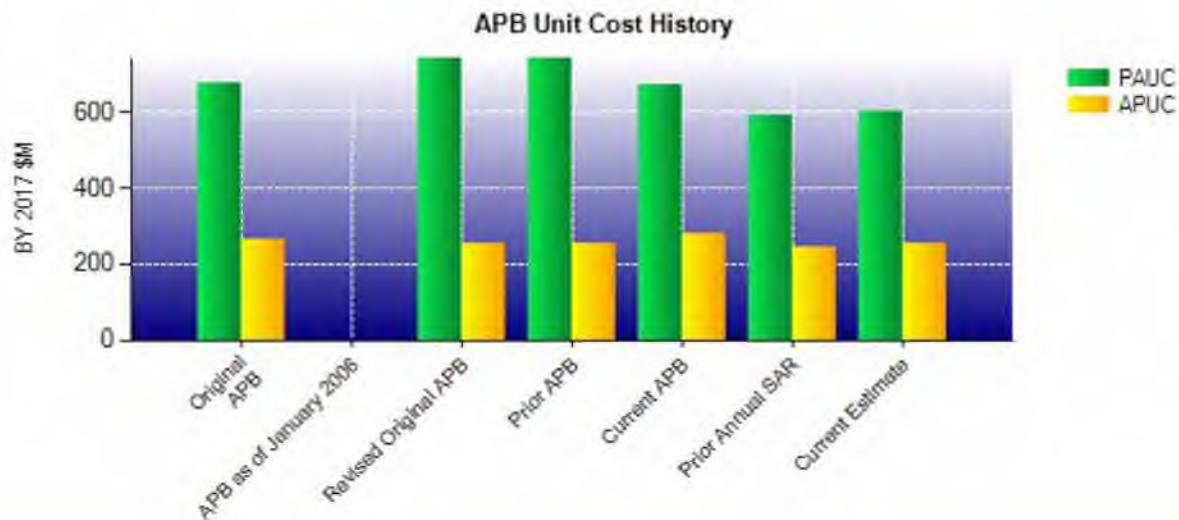
FFC - Future French Carrier

## Nuclear Costs

None

## Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 \$M	BY 2017 \$M	% Change
	Current UCR Baseline (Feb 2020 APB)	Current Estimate (Dec 2019 SAR)	
Program Acquisition Unit Cost			
Cost	2681.8	2402.8	
Quantity	4	4	
Unit Cost	670.450	600.700	-10.40
Average Procurement Unit Cost			
Cost	1114.8	1012.0	
Quantity	4	4	
Unit Cost	278.700	253.000	-9.22
Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 \$M	BY 2017 \$M	% Change
	Revised Original UCR Baseline (Nov 2017 APB)	Current Estimate (Dec 2019 SAR)	
Program Acquisition Unit Cost			
Cost	2227.8	2402.8	
Quantity	3	4	
Unit Cost	742.600	600.700	-19.11
Average Procurement Unit Cost			
Cost	764.2	1012.0	
Quantity	3	4	
Unit Cost	254.733	253.000	-0.68



APB Unit Cost History					
Item	Date	BY 2017 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Dec 2016	676.667	264.233	682.033	279.700
APB as of January 2006	N/A	N/A	N/A	N/A	N/A
Revised Original APB	Nov 2017	742.600	254.733	751.133	266.667
Prior APB	Nov 2017	742.600	254.733	751.133	266.667
Current APB	Feb 2020	670.450	278.700	698.775	305.175
Prior Annual SAR	Dec 2018	590.325	242.125	604.525	259.850
Current Estimate	Dec 2019	600.700	253.000	616.575	272.375

### SAR Unit Cost History

Current SAR Baseline to Current Estimate (TY \$M)									
PAUC Development Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
751.133	0.950	-107.758	0.000	-13.650	-14.100	0.000	0.000	-134.558	616.575

Current SAR Baseline to Current Estimate (TY \$M)									
Initial APUC Development Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
266.667	0.300	13.358	0.000	0.000	-7.950	0.000	0.000	5.708	272.375



SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone A	N/A	Jul 2003	N/A	Jul 2003
Milestone B	N/A	Feb 2005	N/A	Feb 2005
Milestone C	N/A	Aug 2021	N/A	N/A
IOC	N/A	Mar 2022	N/A	Jan 2022
Total Cost (TY \$M)	N/A	2253.4	N/A	2466.3
Total Quantity	N/A	3	N/A	4
PAUC	N/A	751.133	N/A	616.575



**Cost Variance**

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	1438.0	800.0	15.4	2253.4
Previous Changes				
Economic	+2.7	+1.4	--	+4.1
Quantity	--	+320.1	--	+320.1
Schedule	--	--	--	--
Engineering	-54.6	--	--	-54.6
Estimating	-22.8	-82.1	--	-104.9
Other	--	--	--	--
Support	--	--	--	--
Subtotal	-74.7	+239.4	--	+164.7
Current Changes				
Economic	-0.1	-0.2	--	-0.3
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-1.8	+50.3	--	+48.5
Other	--	--	--	--
Support	--	--	--	--
Subtotal	-1.9	+50.1	--	+48.2
Total Changes	-76.6	+289.5	--	+212.9
Current Estimate	1361.4	1089.5	15.4	2466.3

Summary BY 2017 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	1446.7	764.2	16.9	2227.8
Previous Changes				
Economic	--	--	--	--
Quantity	--	+273.8	--	+273.8
Schedule	--	--	--	--
Engineering	-49.6	--	--	-49.6
Estimating	-21.2	-69.5	--	-90.7
Other	--	--	--	--
Support	--	--	--	--
Subtotal	-70.8	+204.3	--	+133.5
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-2.0	+43.5	--	+41.5
Other	--	--	--	--
Support	--	--	--	--
Subtotal	-2.0	+43.5	--	+41.5
Total Changes	-72.8	+247.8	--	+175.0
Current Estimate	1373.9	1012.0	16.9	2402.8

Previous Estimate: December 2018

RDT&E		\$M	
Current Change Explanations		Base Year	Then Year
Revised escalation indices. (Economic)		N/A	-0.1
Adjustment for current and prior escalation. (Estimating)		+0.1	+0.1
Exec Realignment SB Issue (Estimating)		-3.6	-3.8
AAG Training Schedule Delay (Estimating)		-0.9	-1.0
Unliquidate FERS in FY22-FY25 (Estimating)		-0.4	-0.4
NWCF Pay Raise and Rate Model Adjustments (Estimating)		+3.1	+3.7
FY21 - FY25 Issue Cleanup, POM 21 offsets and balancing, and PBD 200 EA-008 Inflation Rate adjustments for non-pay and non-fuel purchases (Estimating)		-0.6	-0.7
PPBS Baseline- PB 20 (Estimating)		+0.3	+0.3
RDT&E Subtotal		-2.0	-1.9

Procurement		\$M	
Current Change Explanations		Base Year	Then Year
Revised escalation indices. (Economic)		N/A	-0.2
Adjustment for current and prior escalation. (Estimating)		+0.2	+0.2
Water Twister Mod II funding (Estimating)		+38.3	+44.2
PPBS Baseline- PB20 (Estimating)		+5.3	+6.2
DON21 OPN Underexecution Review (Estimating)		0.0	0.0
OPN Final Balancing Issue (Estimating)		-0.3	-0.3
Procurement Subtotal		+43.5	+50.1



## Contracts

Contract Identification	
<b>Appropriation:</b>	RDT&E
<b>Contract Name:</b>	Services and Material for AAG SDD
<b>Contractor:</b>	General Atomics
<b>Contractor Location:</b>	3550 General Atomics Court San Diego, CA 92121
<b>Contract Number:</b>	N68335-03-C-0205
<b>Contract Type:</b>	Cost Plus Award Fee (CPAF)
<b>Award Date:</b>	February 17, 2005
<b>Definitization Date:</b>	February 17, 2005

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
95.8	N/A	1	108.5	N/A	1	891.9	886.3

Target Price Change Explanation
The difference between the Initial Contract Price Target and the Current Contract Price Target is due to modifications to the contract to increase scope.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (1/29/2019)	-8.7	-5.9
Previous Cumulative Variances	-2.4	-8.1
Net Change	-6.3	+2.2

Cost and Schedule Variance Explanations
The unfavorable net change in the cost variance is due to software patches to address software deficiencies and functional artifacts.
The favorable net change in the schedule variance is due to the contractor performing to the rebaselined Integrated Master Schedule that more accurately reflects the program.



**Notes**

PM Estimated Price and PM Estimated Ceiling Price reflect the 2016, AIR 4.2 Estimate at Completion plus the total amount of Award Fee paid to the contractor (\$1.5M).

The cost section of this report only represents the values for CLIN 0003 AAG System Design and Development Option. It does not reflect the total contract.

The Over Target Baseline/Over Target Schedule modification to include the re-baselined Integrated Master Schedule was awarded in November 2019.

**Contract Identification**

**Appropriation:** Procurement  
**Contract Name:** AAG / Electromagnetic Launch System (EMALS) CVN 79/CVN 80 Production  
**Contractor:** General Atomics  
**Contractor Location:** 3550 General Atomics Court  
 San Diego, CA 92121  
**Contract Number:** N00019-14-C-0037/1  
**Contract Type:** Firm Fixed Price (FFP)  
**Award Date:** May 08, 2014  
**Definitization Date:** May 18, 2017

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
180.5	N/A	N/A	180.5	N/A	N/A	389.7	389.7

**Cost and Schedule Variance Explanations**

Cost and Schedule Variance reporting is not required on this (FFP) contract.

**Notes**

Contract number N00019-14-C-0037 is a combined EMALS and AAG CVN 79/CVN 80 Production contract to include the AAG Half Engine for a total contract value of \$1475.2M at this time.

CVN 79

AAG = \$190.3M

EMALS = \$541.7M

CVN 80

AAG = \$198.2M

EMALS = \$532.6M

AAG Half Engine=\$12.2M

## Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	0	--
Production	1	1	4	25.00%
Total Program Quantity Delivered	1	1	4	25.00%

### Expended and Appropriated (TY \$M)

Total Acquisition Cost	2466.3	Years Appropriated	18
Expended to Date	1470.1	Percent Years Appropriated	75.00%
Percent Expended	59.61%	Appropriated to Date	2038.4
Total Funding Years	24	Percent Appropriated	82.65%

The above data is current as of February 10, 2020.



## Operating and Support Cost

### Cost Estimate Details

<b>Date of Estimate:</b>	May 02, 2019
<b>Source of Estimate:</b>	AIR 4.2 2019 APB Estimate
<b>Quantity to Sustain:</b>	4
<b>Unit of Measure:</b>	System
<b>Service Life per Unit:</b>	50.00 Years
<b>Fiscal Years in Service:</b>	FY 2018 - FY 2077

AAG shipboard units, included in quantity to sustain, are based on the GERALD R. FORD-class Unit Quantities and Program of Record as of December 1, 2016 (CVN 78, CVN 79 and CVN 80) plus the addition of the fourth ship (CVN 81) to the program of record.

AAG system service life is based on an equivalent 50 year carrier service life.

Fiscal year placed in service identifies the year CVN 78 delivers with an AAG shipboard unit installed and operating.

Fiscal year retired identifies the planned year CVN 80, with an AAG shipboard unit installed and operating, is decommissioned.

O&S costs identified for AAG are included in the CVN 78 Class SAR.

### Sustainment Strategy

AAG is currently in operation onboard the CVN 78. The maintenance concept for AAG utilizes a three level strategy (O, I, D). O-level repairs will be performed by the fleet while minimal I-level repairs will be performed by the ship's Aircraft Intermediate Maintenance Department as well as the Carrier and Field Service Unit. Organic vs. contractor Depot to be determined by future business case analysis scheduled to be conducted in FY 2020-2021. The depot facility is currently scheduled for stand up in 2nd quarter (QTR) FY 2023. Until the Navy takes over configuration control of AAG, depot level repairs will be performed by the original equipment manufacturer (OEM). The software support concept is planned to transition to an organic Software Support Activity (SSA) at Naval Air Warfare Center Aviation Division, Lakehurst, NJ. Until standup of the organic SSA occurs in 1st Quarter FY 2021, software support will be provided by the OEM. Supplies of On Board Repair Parts (OBRPs) for CVN 78 is complete. Interim Spares will be procured to support replenishment of OBRPs and support AAG through PDT&T. Material Support Date (MSD) achieved as of February 3, 2020. A Repair of Repairables contract was awarded in FY 2017 for repair of AAG Depot Level Repairables. Initial and interim training has been and will be provided to the fleet by the OEM until the formal follow-on training curriculum and training schoolhouse is stood up in 4th QTR FY 2022.

### Antecedent Information

No antecedent.

AAG is specifically designed to meet the requirements of the CVN 78 Class. The advanced technologies and capabilities, and unique ship interface requirements of AAG do not exist in any legacy recovery systems. As such, there are no comparable antecedent systems.



Annual O&S Costs BY2017 \$M		
Cost Element	AAG Average Annual Cost Per System	No Antecedent (Antecedent) None
Unit-Level Manpower	4.438	--
Unit Operations	0.000	--
Maintenance	4.123	--
Sustaining Support	3.137	--
Continuing System Improvements	3.694	--
Indirect Support	3.209	--
Other	0.000	--
Total	18.601	--

Average and total O&S costs are sensitive to carrier schedule and ships operating with the AAG system.

Item	Total O&S Cost \$M		
	AAG		No Antecedent (Antecedent)
	Current Development APB Objective/Threshold	Current Estimate	
Base Year	3701.1	4071.2	3701.1
Then Year	7844.1	N/A	7844.1

The 11 ship extrapolated BY2017 estimate is as follows:

$$\text{Notional total O\&S cost 11 ships} = \$16.345\text{M} * 11 * 50 = \$8,990\text{M BY 2017}$$

An equivalent calculation in BY 2000 dollars was provided to the CVN 78 Program Office for reporting in the FORD Class SAR.

$$\text{Notional total O\&S cost 11 ships} = \$11.030\text{M} * 11 * 50 = \$6,066\text{M BY 2000}$$

#### Equation to Translate Annual Cost to Total Cost

Total Cost (BY17\$M)= Average Annual cost Per Shipset \* Number of Shipsets \* Service Life = \$18.601M \* 4 \* 50 = \$3,720M

Note: The total cost does not match the APB base year objective value because ~\$20M of Hardware Modifications from FY17-FY21 was removed from O&S added to acquisition procurement.

O&S Cost Variance		
Category	BY 2017 \$M	Change Explanations

Prior SAR Total O&S Estimates - Dec 2018 SAR	2793.1	
Programmatic/Planning Factors	708.0	Quantity change to add CVN 81 to program baseline.
Cost Estimating Methodology	404.0	Updated methodology for continuing system improvements, sustaining support, and training
Cost Data Update	0.0	
Labor Rate	96.0	Updated METEOR indirect rate values from 2016 to 2018 rates
Energy Rate	0.0	
Technical Input	-300.0	Updated reliability information
Other	0.0	
Total Changes	908.0	
Current Estimate	3701.1	

#### Disposal Estimate Details

Date of Estimate:

Source of Estimate:

Disposal/Demilitarization Total Cost (BY 2017 \$M):

AAG disposal costs are included in the CVN 78 Class Disposal Cost.